The American Chestnut Tree: Recovery and Reforestation Efforts Underway

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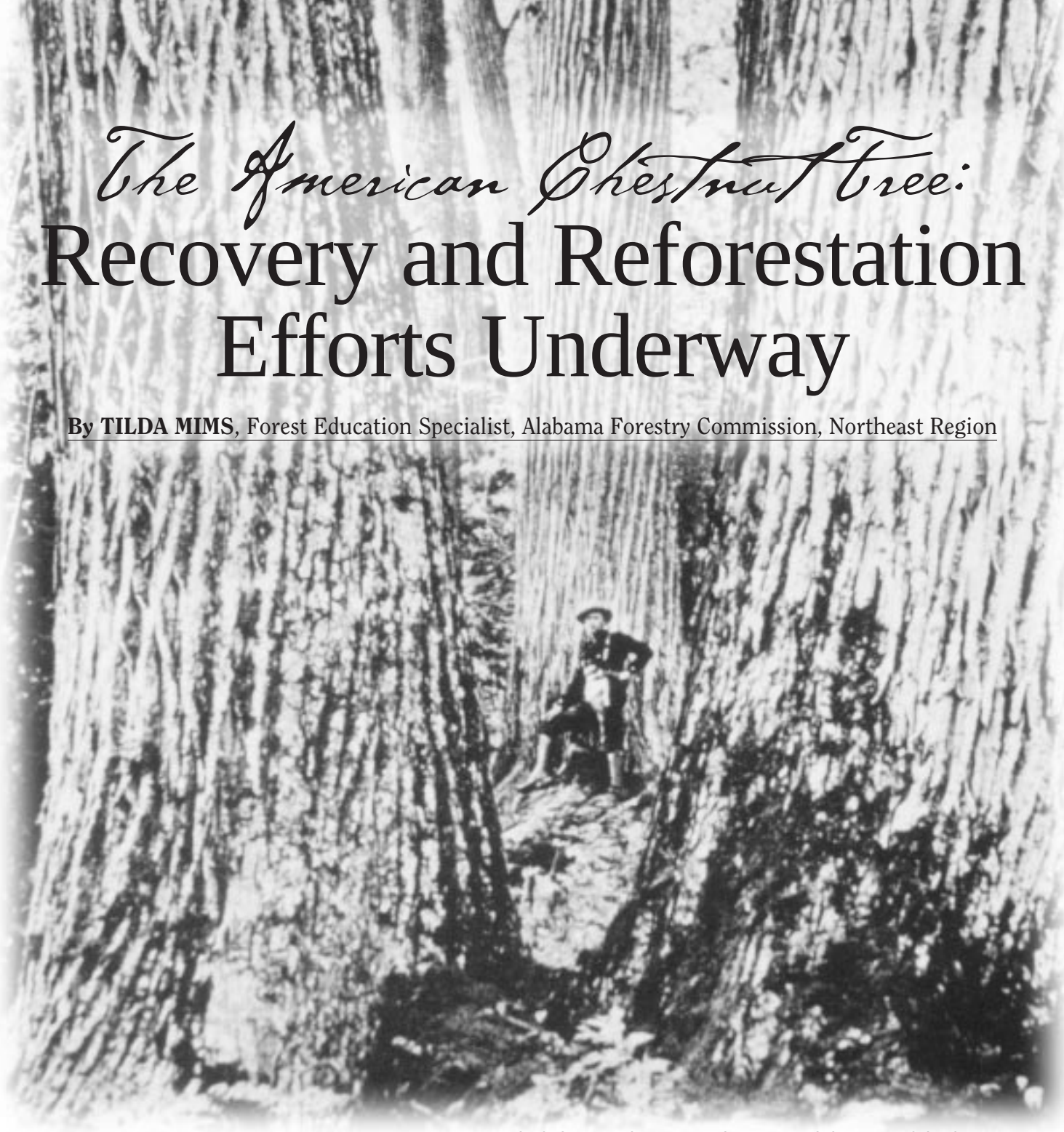

A pure stand of chestnut in Connecticut around the turn of the last century.

The American chestnut tree was once an important part of the forests of eastern North America. In the heart of its range, the central Appalachians, it represented one of every four hardwoods.

The tree's consistently heavy nut crop was the single most important food for a variety of wildlife, and was a significant food for livestock and people. Chestnut wood was highly rot-resistant and used for everything from barn beams to railroad ties and fine furniture. Musical instruments used about one-half of the wood, especially pianos and pipe organs.

Once abundant from southern Maine to the Florida panhandle, the American chestnut (*Castanea dentata)* was the victim of two major attacks. In the early 1800's, Ink Disease entered the U.S. on cork oaks from Portugal. Ink Disease is a root disease that moves through soil, and trees do not recover from Ink Disease. The disease rapidly eliminated all American chestnut trees in lowland areas along the gulf and eastern seaboard.

A second attack came around 100 years later, when trees in upland areas were destroyed almost to extinction by Chestnut Blight. Today, living, old chestnut trees are very rare. The once majestic tree is now reduced to an understory shrub that dies, sprouts from the base, dies and sprouts again.

Chestnut Blight

The fungus *Cryphonectria* (formerly called *Endothia*) *parasitica* causes Chestnut Blight. Cankers were found on American chestnut trees lining the avenues of the Bronx Zoo in New York City in 1904. In 1907 and 1908 the fungus was found on other species of chestnut in the New York Botanical Garden. The blight moved at an alarming speed, fifty miles a year, destroying an estimated 9 million acres of trees in less than 50 years.

Chestnut Blight gets into broken branches, growing under the bark until the tree is girdled. The fungus is spread by everything that flies, walks or crawls across the canker and goes to another tree with broken branches. Cankers are usually easily recognized because the thin bark of young trees or sprouts becomes orange where the fungus has grown. Thick bark may have dots of orange but the most telling signs of cankers in such bark are epicormic sprouts that form below the canker when the cambium is killed.

The fungus does not enter the root collar at the base of the tree, so trees sprout back each year, creating a multiple-stemmed shrub. Sprout clumps surviving today are remnants of original trees.

After the blight fungus was discovered in the United States, plant explorer Frank Meyer found it in both Chinese and Japanese trees. He also noted Asian trees were often very resistant to the disease, showing few symptoms when infected. Meyer concluded that Asian trees imported into the U.S. brought the blight with them.

In 1912, the Plant Quarantine Act was passed to reduce the chances of such a catastrophe happening again.

Chestnut Research

The American chestnut was considered a hopeless cause until the late 1950's, when a chestnut recovery phenomenon was discovered and studied by Jean Grente in France. He called the system "hypovirulence," because the chestnut blight fungus he isolated had less than normal ability to kill chestnut trees. As hypovirulent strains spread through chestnut orchards of Italy and France, trees began to live longer, "healing" over blight cankers with lumpy bark tissue.

Scientists place bits of a hypovirulent blight fungus into holes in the bark around cankers, the cankers then stop expanding, and the tree's natural defenses protected the tree's living cambium. In 1972, Grente sent hypovirulent cultures to Dr. Sandra Anagnostakis and the Connecticut Agricultural Experimental Station where testing in the laboratory and greenhouse had encouraging success. Through the breeding program, they have developed fully resistant trees that are mainly American chestnut; the resistance is from a Japanese or Chinese chestnut.

Logging American chestnut in New England.

Recovery Efforts in Alabama

Dr. Anagnostakis and Marshall Case, Executive Director of The American Chestnut Foundation (TACF), presented an American chestnut seminar in Florence this summer at a meeting sponsored by the Lauderdale County chapter of the Alabama TREASURE Forest Association. Dr. Anagnostakis reported on her research at the Experiment Station and how Alabama can help. "We will plant our new resistant hybrids into plots in northern Alabama and parts of Tennessee and Georgia, where they will cross with native trees, incorporating the enormous genetic diversity that still exists in the forest," she stated. The first generation offspring will be intermediate in resistance but in subsequent generations, trees with full resistance will be produced.

TACF's approach is to continually cross back to the American parent, not to Asian species. This method, called backcross breeding, is the standard method for transferring a single trait to an otherwise acceptable plant. The goal is to produce fully resistant trees which are fifteen-sixteenths American and one-sixteenth Chinese.

"Alabama could be a very significant player in this effort because of the rich generic diversity in your forests," Case said. The chapter will assist with funding and field testing of resistant trees in the North Alabama area where chestnuts survived the first disease. TACF plans to introduce these trees to the forest by 2010.

Resources

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